

Sheet One



Choose the correct answer of the following:-

1- The fundamental quantities in physics are known as.....

(Mass, force, time – mass, velocity, length – mass, length, time)

2- In CGS system, the fundamental units are

(Centimeter, gram, second – meter, gram, second – meter, kilogram, minute)

3- In MKS system, the fundamental units are

(Foot, gram, second – meter, kilogram, second – meter, kilogram, minute)

4- In FPS system, the fundamental units are

(Foot, gram, second – meter, kilogram, second – foot, pound, second)

5- The international system of units (SI) coincides with System in its mechanical quantities

(MKS – CGS – FPS)

6- The dimensional formula of the velocity is denoted as

$(LT - LT^2 - LT^{-2} - LT^{-1})$

7- The dimensional formula of the acceleration is denoted as

$(LT - MLT^2 - LT^{-2} - MLT^{-1})$

8- The dimensional formula of the velocity is denoted as

$(LT - LT^2 - LT^{-2} - LT^{-1})$

9- The dimensional formula of the force is denoted as

$$(MLT - MLT^2 - MLT^{-2} - MLT^{-1})$$

10- The dimensional formula of the pressure is denoted as

$$(MLT - MLT^2 - ML^2T^{-2} - ML^{-1}T^{-1})$$

11- The dimensional formula of the density is denoted as

$$(ML - M^3L^{-3} - ML^{-3} - ML^{-2})$$

12- The dimensional formula of the work is denoted as

$$(MLT - ML^{-1}T^2 - ML^2T^{-2} - MLT^{-1})$$

13- The dimensional formula of the power is denoted as

$$(MLT^{-1} - ML^{-1}T - ML^2T^{-3} - MLT^{-3})$$

14- The dimensional formula of the potential energy is denoted as.....

$$(MLT - ML^{-1}T^2 - ML^2T^{-2} - MLT^{-1})$$

15- The dimensional formula of the kinetic energy is denoted as

$$(MLT - ML^{-1}T^2 - ML^2T^{-2} - MLT^{-1})$$

16- The dimensional formula of the coefficient of viscosity is denoted as.....

$$(MLT - ML^{-1}T^{-1} - ML^{-1}T^{-2} - MLT^{-1})$$

17- The velocity in FPS system equals to.....velocity in CGS system

$$(30.48 - 0.3048 - 0.0328 - 304.8)$$

18- The velocity in CGS system equals to.....velocity in FPS system

$$(30.48 - 0.3048 - 0.0328 - 304.8)$$

19- The acceleration in CGS system equals to.....acceleration in FPS system

$$(30.48 - 0.3048 - 0.0328 - 304.8)$$

20- The acceleration in FPS system equals to.....acceleration in CGS system

$$(30.48 - 0.3048 - 0.0328 - 304.8)$$

21- The force in FPS system equals to.....force in CGS system

$$(1.382 \times 10^4 - 1.382 \times 10^{-4} - 0.7236 \times 10^4 - 0.7236 \times 10^{-4})$$

22- The force in CGS system equals to.....force in FPS system

$$(1.382 \times 10^4 - 1.382 \times 10^{-4} - 0.7236 \times 10^4 - 0.7236 \times 10^{-4})$$

23- The force in MKS system equals to.....force in CGS system

$$(10^5 - 10^{-5} - 10^4 - 10^{-4})$$

24- The force in FPS system equals to.....force in MKS system

$$(1.382 \times 10^4 - 1.382 \times 10^{-4} - 0.7236 \times 10^4 - 0.7236 \times 10^{-4})$$

Problems

1-Convert the following: (a) 1 kilometer per hour to meter per second, (b) 1 mile per hour to meter per second, and (c) 1 mile per hour to kilometer per hour [to a good approximation 1 mile = 1.609 km].

2- A simple pendulum has periodic time T given by the relation: $T = 2\pi \sqrt{\frac{L}{g}}$

where, L is the length of the pendulum and g is the acceleration due to gravity in units of length divided by the square of time. Show that this equation is dimensionally correct.

3- Suppose the displacement s of an object moving in a straight line under uniform acceleration (a) is giving as a function of time by the relation:-

$s = ka^m t^n$, where, k is a dimensionless constant. Use dimensional analysis to find the values of the powers m and n .

4- Newton's law of universal gravitation is given by $F = Gm_1m_2/r^2$, where, F is the force of attraction of one mass, m_1 , upon another mass, m_2 , at a distance r . Find the SI units of the constant G .

5- Find a proportionality relationship using dimensional analysis of centrifugal force F in terms of mass m , velocity v and radius r .

6- In fluid mechanics, the Reynolds number (R) is a dimensionless number that proportional to fluid velocity v , density ρ , viscosity μ and a characteristic length r . Find a proportionality relationship using dimensional analysis that connect Reynolds number with these variables, where the dimensions of μ is given as $M L^{-1} T^{-1}$.